Rad Sur Atmos · 1624

31 July, 1947

W. H. Ray — Health Physics

T. H. J. Burnett — Health Physics

Waste Monitoring Group Report for July, 1947.

The three outdoor constant air monitoring installations have been operated this month subject to a resurgence of equipment difficulties, both of scaler irregularities and relay contact troubles. Bias adjustments, stage tuning, tube replacements and switch contact replacements and adjustments highlight the remedies effected. Efforts to apportion a part of the necessary scaler servicing to the 105 Instrument Group were stultified by delays on two occasions. For standby use at month's end we have at last available two scalers, one repaired and overhauled by the 717-B Instrument Group and the other overhauled by T. H. J. Burnett and J. A. Harter. This should minimize data loss by scaler failure. The third Trafficounter was converted to AC power supply this month and is working better.

Design and sketching of the orfice assemblies needed for airflow measurements on our constant air moniters has been completed and a work order issued for their fabrication.

Using the activities of P^{32} and I^{131} as simulating point sources, data was taken for an empirical check of the geometry factor of the collection tubes of the constant air moniters, and also response data of several ratemeter circuits to permit a calibration of the constant air moniters installed in buildings 706-C, 706-D, and 205. In building 706-C the installation was found unsatisfactory because of bleeding effects and a recommended change reduced these. Upon completion of the computations and possibly some additional confirmatory data, these results will be separately reported.

Partially satisfactory airflow measurements were made on the new model precipitron and a few comparative tests made with the old, or present, precipitrons both simultaneous runs and sequence combinations of connected units. Additional confirmatory data is considered desirable, whereupon the results will be separately reported. On the basis of tests to data the new model has several advantages and is felt to be probably satisfactory in most respects.

The timing switch was installed on the "filtron" in 706-D but tests with this have been deferred pending receipt of additional standard special filter paper ordered from A.E.C. At this date it has been determined that a moderate quantity of filter paper of possibly adequate characteristics is on hand at room 204, building 105.

Results of the down river water survey are finally completed and separately reported.

No mud run was made during July because of vacations and lack of replacement personnel.

The 7 unit water heater is installed in room 204, building 105 awaiting test and use.

During July there were 28 temperature inversions, 25 of which were accompanied by upsurges of activity, and on 2 additional instances. There was no data to check.

The highest of these were: July 2-3, at 706-A, a rise of 4900 x 128 counts in 11 hours, of short activity dropping to half the peak value after about 3 hours; July 21-22, at 706-A, a rise of 4000 x 128 counts in 4 hours, not analysed, as R. D. Cameron changed and discarded the old filter paper; July 22-23, at 735-B, a rise of 5600 x 128 counts in 2 hours, on which filter paper a decay curve is being run. The last of these appears to have been perhaps considerably I^{131}, to about 1.1 x 10^{-7} uc/cc, 30% above tolerance.

An 18 ft. malaria control boat with motors and accessory equipment is being procured from T.V.A. for water survey use, delivery is anticipated for early after the first of August.

THJB:ejp

T. H. J. Burnett

cc: W. H. Ray
K. Z. Morgan
T. H. J. Burnett
C. File
R. File

[redacted]

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David C Hamm 5/30/95
Technical Information Officer ORNL Site — Date

14

W. H. Ray 9-8-47

[redacted]

CLASSIFICATION CANCELLED
DATE APR 15 1959
CLASSIFICATION ORGANIZATION DIRECTOR
OAK RIDGE NATIONAL LABORATORY

CLINTON LABORATORIES
CENTRAL FILES NUMBER
XT-47-9 166

To: W. H. Ray

From: T. H. J. Burnett

September 2, 1947

In re: Waste Monitoring Group Report for August, 1947.

Minor troubles with scalers and microswitches have caused data loss between 15 and 20% in the operation of the three outdoor constant air monitors. Three additional GM tubes for the air monitors have been completed which will facilitate changes and enable a preventive maintenance program. Improvement has been noted in scaler servicing by the instrument shop. Ultimate completion of an improved, more stable integrating circuit to permit possible substitution of ratemeters for scalers is envisioned.

During the 31 days of August there were 31 temperature inversions, all of which were accompanied by increases of air activity. Of these only two merit mention: that of August 11-12 in which a rise of 540 x 128 counts occurred in 3 hours while an Iodine evaporation was in process, indicating 7.3×10^{-9} μc/cc activity; the other an instance of a high rise from 5 to 7 AM, August 25, singularly indicated at 11S-B and considered as due to erratic scaler functioning. A sharp daytime rise in activity was particularly noted between 3 and 4 PM, August 13, indicating an average level of 4.6×10^{-8} μc/cc, this coincided with an Iodine^{131} run.

Reports were separately made of calibration of air monitors in 706-D and of the geometry factor of the air monitor GM tube assembly. Unsatisfactory equipment and consequent changes have delayed calibration of 706-C and 205 air monitors. New sources will need to be procured for this work owing to the passage of half-lives on those formerly used.

Further tests of the new precipitron are to be made by H. W. Speicher of the Research and Development Group.

Filter paper supplies of the 9 mil thickness have been received but the extra heads for the filtron are not yet finished. The orifice assemblies are nearly completed, with delivery due early in September.

The 18 ft. malaria control boat was received from TVA, duckboards were installed, and "U.S. Gov't. Property" was painted on both sides. At present this boat is tied up and locked at the north end of White Wing Bridge. The access road to the proposed dock site is complete and it will be possible to use the boat, loading from the shore. However this will involve considerable difficulty owing to the shallow water. The dock needed is being delayed by the red tape of TVA and War Department approvals.

The 14 ft. boat used on White Oak Lake was bailed out and moved to a more accessible spot midway on the north shore, and locked with a chain.

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DATE 6-9-54

[redacted]

The results of immersion counts of White Oak Dam and Settling Basin water samples by the laundry are less consistent than formerly. Variations in background counts suggest cleaning difficulties with the large and small cylinders.

The total activity discharged from the Settling Basin during August decreased 22% below that in July with a corresponding decrease of specific activity.

A tentative program of water sampling has been outlined and plans have been begun for the annual mud survey.

T. H. J. Burnett

THJB:ejp

cc: W. H. Ray
K. Z. Morgan
F. Western
C. E. Haynes
T. H. J. Burnett
C. File
R. File

[redacted]

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David P Hamm 5/30/95
Technical Information Officer Date
ORNL Site

M. M. Longerfell

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No. 10 of 12 copies. Series A. 1624

[redacted]

February 6, 1948

CLINTON LABORATORIES
CENTRAL FILES NUMBER
48-2-189

To: J.H. Roberson

From: T.H.J. Burnett

Subject: Waste Monitoring Group Report for January, 1948

AIR ACTIVITY MONITORING AND STUDY

General (Instrumentation)

Instrument difficulties have continued during January to a somewhat lesser extent. Using the Esterline-Angus operations meters the data loss on the 3 outdoor constant air monitors was 29.5% as compared with 37% during December. This represents less improvement than hoped for. Wind data loss was 4.8%.

Air Contamination Instances

The maximum upsurges of air activity recorded during January were less than 10% tolerance based on the 8.5×10^{-8} μc/cc tolerance value of I^{131}, except for one instance January 22, where a value of 80% of tolerance was reached and prevailed at peak for about 10 minutes. The total length of upsurge was less than an hour and preliminary half life estimates indicate probably Ba^{140} as the source. Two subsequent apparent rises in air activity seem to be erratic tube behavior.

[redacted]

[redacted]

[redacted]

Meterological Data

There were 23 inversions during January, accompanying which were various increases of air activity roughly proportional inversely to wind velocity and directly to the extent of thermal difference.

Rainfall during January was 3.12 inches to compare with 3.00 inches in December and the 1947 average of 3.55 inches.

Wind direction frequency percentages and average hourly directional velocities are:

Direction	Frequency	Velocity
North	0.4%	4.3 mi/hr.
Northeast	0.6%	12.2 mi/hr.
East	40.9%	6.3 mi/hr.
Southeast	2.7%	3.3 mi/hr.
South	1.3%	1.5 mi/hr.
Southwest	31.3%	8.9 mi/hr.
West	22.8%	6.0 mi/hr.

Sundry

Further tests on the new precipitron, by H.W. Speicher, and consequently, initial tests on the filtron are awaiting a precision orfice being prepared by the machine shop. It is expected that the precision orfice and two of the present orfices will be sent to the Bureau of Standards for caliberation.

Mr. Manta, Brookhaven meterologist, visited January 7 and 8, conferring on features of a meterorological study desirable here. No progress has been made towards development of the instruments discussed as required for air activity measurements at elevations up to 3000 ft.

[redacted]

LIQUID WASTE DISPOSAL MONITORING AND RESEARCH

Routine Monitoring Results

Immersion γ counts of 21 daily samples each of Dam and Settling Basin water indicate an activity concentration reduction factor of 8.9 which is less than in December although the rainfall was more. However, much of the rainfall was snow and still on the ground unmelted at month's end.

Total β curies discharged from the Settling Basin were 48% less than in December and 63% less than the monthly average for 1947.

Beta Water Counting

The backlog of daily water samples has been resolved except for completion of computations. Some samples had supernatent components of weights considerably beyond the range of previous self absorption data. To correctly adjust the obtained count to an equivalent count for zero weight, 10 samples each of Dam and Settling Basin supernatent solids were carefully prepared to cover the extreme range to be measured.

At the request of the Special Activities Hazards Committee, samples were taken of the sewer discharge southeast of 706-A to be checked for activity. The α activity will be determined by L.B. Farabee. Aliquots gave β, γ values averaging 3×10^{-4} μc/l. which is only 50% above the Clinch background, while the creek water at the point of sewage addition averaged 3×10^{-3} μ c/l., reason currently undetermined.

[redacted]

Owing to the cold, snow and frozen ground the major part of this month, the mud survey planned was not performed. Trainee assistance will simplify the time requirements for a complete assay.

Likewise no river samples were obtained and the river boat is still at the water pumping station after its use for recovery of their drifting boat.

General

The river dock near White Wing Bridge is substantially complete and will facilitate river survey work.

No work has been done on lake silting measurements yet, between the weather and insufficient personnel hours available.

White Oak Dam has still no 115 v. A.C. power available for instrument recording of activity.

The study of a slow flow area for improvement in settling out of activity adsorbed on mud particles has been completed and estimates prepared for two alternate plans.

Owing to the accumulation of snow and the flood hazard which a melting rain would cause, the gate at White Oak Dam was lowered from 4' open to 5' open January 29, 1948.

Answering the inquiry of E.J. Witkowski, a basis was defined for the computation of β curies of discharged activity in a memo by T.H.J. Burnett "Water Activity Computations" dated January 14, 1948.

[redacted]

Samples of algae were collected from the Settling Basin and a study begun of the fixation of activity using successive washes and filtrations. Dr. Edward Berry from Hanford expressed interest in this as paralleling some tests made by them.

Growth of some common food plants is planned, using contaminated soil and directed to measurement of their uptake of activity.

Data on the amount of silt and solids content in water samples taken October, Novemeber and December 1947 was tabulated for study and correllation with rainfall and, later on, activity variations.

Four samples of Settling Basin effluent were prepared of differing initial volume, and a special decay and simultaneous absorption series of counts begun, directed to the practical measurements of the rate of decay of the various energy components.

T. H. J. Burnett

THJB:rr

Distribution
1. J.H. Roberson
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3. F. Western
4. C.E. Haynes
5. W.H. Ray
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J. A. Roberson

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CLINTON LABORATORIES
CENTRAL FILES NUMBER
47-12-393

December 10, 1947

To: R.H. Firminhac

From: T.H.J. Burnett

In Re: Waste Monitoring Group Report for November, 1947

AIR ACTIVITY MONITORING AND STUDY

General (Instrumentation)

Instrument difficulties have been more general during November than at any time to date. Data loss on the 3 outdoor constant air monitors was 56%, which exceeds the previous all time high of 46% loss in October. The trafficounter mechanisms and expecially the microswitches operating the counting relays have given the largest amount of trouble. A modification of an Esterline-Angus operations recorder has been proposed by the 706-A instrument repair group as an alternative recording mechanism so they might not have so much servicing to perform. Special microswitches with nickel contacts (plated by J.H. Wilde) have been supplied to the 105 instrument repair group for test usage to determine if they will resist arc damage. The wind recording instrument has also given considerable trouble with 41% data loss during November. Circuit study has begun for the development of a more dependable ratemeter to use with constant air monitors and perhaps also be applicable to water monitoring.

Air Contamination Instances

The maximum upsurges of air activity recorded during November are tabulated as follows, using for tolerance the value 8.5×10^{-8} μc/cc of I^{131}.

% Tolerance	Date	Approx. Duration
62%	Nov. 6	3 - 5 hrs.
38%	Nov. 17	6 - 8 hrs.
31%	Nov. 29	7 - 9 hrs.

In these instances the decrease in activity was at a rapid enough rate that no decay curve was attempted on the filter paper.

Meteorological Data

There were 25 temperature inversions during November, accompanying which the recorded level of air activity increased to varying extents, being related to the wind velocity as well. Poor data prevents proper correlation for November.

Rainfall during November was 4.76 inches, 2.37 times as much as in October and the most this year since January's 7.93 inches.

Wind direction frequency percentages and average hourly directional velocities are:

	Frequency	Velocity
East	45%	6.3 mi/hr
Southeast	1%	2.7 mi/hr
South	14%	7.0 mi/hr
Southwest	38%	6.8 mi/hr
West	2%	1.0 mi/hr

Sundry

Tests on the new precipitron are nearing completion and results in terms of efficiency, optimum air flow and optimum voltage are anticipated. Following this it is hoped that comparative tests will give corresponding data for the filtrons in use. The orfices for metering air flow in air monitors have still not been calibrated or installed.

LIQUID WASTE DISPOSAL MONITORING AND INVESTIGATION

Routine Monitoring Results

Immersion γ counts of 18 daily samples of Dam and Settling Basin water indicate an activity concentration reduction factor of 19. Since this is not quite twice that for October and more than twice the rainfall occured, the failure of the additional dilution to produce the proportional decrease in concentration might be explained by the scouring action of increased creek flow to pick up activity and mud settled out in prior periods. For accurate data upon which to base conclusions, there is need for suitable constant water monitoring equipment in use.

Total β curies discharged from the Settling Basin were 8% more than in October and 29% less than the average for this year to date.

Beta Water Counting

The techniques involved in handling the large (15 liter) sized samples of water taken daily from the Settling Basin and White Oak Dam have proven to be unsuited to the inadequate space and equipment facilities presently available. The result has been that the backlog of unfinished samples has increased steadily.

Until the laboratory can be moved to its larger quarters in the new building, 1 liter samples will be tried and should give less difficulty from the standpoint of self absorption corrections. The data obtained thus far from the 15 liter samples will, when completed, furnish worthwhile material for silt content studies. Large samples will continue to be needed for river water determinations.

As a result of the difficulties above noted, the special Harriman, Oakdale, and Clinch River water samples are not finished and the annual mud assay has not progressed significantly. A further handicap has been the delay in providing additional electrical outlet capacity for laboratory operations.

General

Analysis of fission products in composite samples of White Oak Dam and Settling Basin effluents was noteworthy in the sizeable quantity of Pu α counts compared to the last previous analysis reported April 8, 1947. Likewise, a higher amount of activity was noted for the Dam discharge, with Ru and Cs five times the value of Sr.

To date it has not been feasible to undertake silting extent measurements in White Oak Lake with TVA's offered assistance.

Constant water monitoring at White Oak Dam will become possible after completion of a project issued for providing electric power there.

Approvals for the dock needed for our river monitoring work have been received and a project is being drawn up to construct this.

The survey of the dike region of White Oak Basin is complete and a study is being made of the best methods for re-establishment of the dike and a slow flow rate settling area, preparatory to requesting a project for this.

T.H.J. Burnett

THJB:rr

cc
1. R.H. Firminhac
2. K.Z. Morgan
3. F. Western
4. C.E. Haynes
5. W.H. Ray
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W. H. Ray 10-16-47

W. H. Ray

CLINTON LABORATORIES VA1b

CENTRAL FILES NUMBER

47-10 95

1624

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David R Hamm 5/30/95

Technical Information Officer ORNL Site — Date

CLASSIFICATION CANCELLED

DATE APR 15 1959

BY DIRECTION OF CLASSIFICATION DIRECTOR

OAK RIDGE NATIONAL LABORATORY

AUTHORITY DELEGATED BY AEC 9-10-57

October 1, 1947

To: R.H. Firminhac

From: T.H.J. Burnett

In Re: Waste Monitoring Group Report For September, 1947

Air activity during September was minor, with no noteworthy high upsurges. It is probably not coincidental in this connection that there was no barium run during this period. As usual, the inversions were accompanied by slight upsurges.

Minor troubles with microswitches continue to prevent perfect data collection on our trafficounters in the three stationary air monitors. A revised circuit was drawn up on the trafficounter showing the present AC power supply. Prints of this were furnished the instrument group who assume maintenance and service of the trafficounters. A weekly replacement program of GM tubes was inaugerated. No further progress on the ratemeter circuit to replace the scalers has occurred.

Orfices for airflow measurement were received from the pipe shop but have not been caliberated. An Alnor velometer is now on hand which may be useful for some airflow measurements.

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4-16-59 SIGNATURE

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The filter paper container heads for the filtron were received but tests on the filtron are awaiting completion of precipitron tests by H.W. Speicher.

Plans for the dock needed for our river water sampling program were completed, prints made and suitable letters written to request appropriate clearances and approvals from TVA and the War Department.

Request was initiated for 110 V. AC power at White Oak Dam to be used for water activity monitoring with equipment being developed.

A determination of the watershed area of White Oak Creek was made using contour lines and data from the Bethel Valley Quadrangle map and was evaluated to be 152.4 million square feet. On this area, each inch of rain would be 12.7 million cubic feet of water. Discharge flow rate through the upper dam gate with the lake level at the top of the dam is 950,000 cu ft/hr.

T.V.A. when contacted did not have any data on the original topography before White Oak Dam was built, but offered to aid us in any determinations of the amount of silting, having experience with similiar problems.

The survey of White Oak Valley for replacement of the lower dike has been postponed until November.

[redacted]

Caliberation of the chart at the dam to permit lake level fluctuation studies has been begun.

Collection of daily five gallon samples at the dam and at the settling basin for β reduction efficiency determinations has been begun.

Spot samples at different points of the White Oak Creek course were taken to give data on silt and activity content of the water. Results will be separately reported.

Total β curies from the Settling Basin are down 4% below August and 22% below the average of the year to date.

Immersion γ counts of Dam and Settling Basin water samples indicate a reduction factor of 10.

15 liter samples of Dam and Settling Basin water, accumulated a liter a day, were submitted for radiochemical determination of fission product activities present.

T.H.J. Burnett

THJ:rr
cc: K.Z. Morgan
F. Western
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DATE APR 15 1959

CLINTON LABORATORIES
CENTRAL FILES NUMBER
47-11-340

November 4, 1947

J. H. Roberson
Copy 7

To: R.H. Firminhac

From: T.H.J. Burnett

In Re: Waste Monitoring Group Report for October, 1947

In conjunction with Barium Run #21 which began October 5, 1947 and was shipped 15 days later, there were two instances of relatively high air activity. An inversion lasting from about 5 P.M. October 13 to 10 A.M. October 14 coupled with a slight east wind averaging less than 2 miles per hour caused an upsurge of activity of ill defined extent averaging an indicated concentration of around 7×10^{-8} μ c/cc. The other case was the morning of October 7 when, however, the inversion was very slight and accompanied by a strong east wind averaging better than 8 miles per hour. In this latter instance, the air monitor at 735-B was out of order, and the direction and velocity of the wind made the monitors at 706-A and 115-B of no particular value. A clean filter paper put on the tube of 735-B showed an increased scaling rate of 300 c/m over a 30 minute period which would give a concentration there of about 2×10^{-10} μ c/cc around 1 P.M.

Values directly down wind from 706-D, the known source of this contamination may have been higher. The decay graphs run on the filter papers of the October 14th instance showed a mixture of activities, a long component identifiable as I^{131} with its 8 day half life and about an equal amount of what showed as an 11 hour activity being probably a mixture of 22 hr I^{133} and 6.7 hr I^{135}. Values found would be 18% below the one year tolerance concentration.

Performance of equipment as indicated above was poor during October and this assumes significance in view of the assumption by the Instrument Group of their servicing the last of September. Data loss was 46%, the highest to date.

During October there were 28 inversions, accompanied to varying intensities by rises of air activity, as well as could be determined from such data as was available. Rainfall of 1.99 inches was the lowest since February's 1.93 inches.

During October there was no known progress made in the development of a stable ratemeter circuit to replace the scalers used with the constant air monitors. Likewise, the orfices were not caliberated for use in measuring airflow. Tests on the filtron continue to await completion of the new precipitron efficiency determinations in progress by H.W. Speicher.

Approvals for the dock required for our river monitoring work have not been finally received as yet but are expected soon.

Electrical power available at White Oak Dam for constant monitoring of water activity is being considered as available by motor generator most feasibly.

Redeterminations of the White Oak Creek watershed give an average figure of 13.3 million cubic feet of water per inch of rain ± less than 5%. Estimates of sectional areas of this watershed were made, giving dilution ratios for successive points of the course of the stream. Weighted for dilution, the removal efficiency of the drainage system appears to be about a factor of 3, indicating activity loss over the dam of an average of around a curie per day.

Thus far, the man hours available have not permitted utilization of the offer by TVA to help determine the extent of silting in White Oak Lake.

The survey of White Oak Valley topography upstream from the lower dike is now in progress. Activity levels up to 60 mr/hr wer encountered by the men doing this work in the area nearest the settling basin.

Caliberation of the lake level chart versus upper gate position was completed, varying the lake level about 2 1/2 feet in a period of 17 days.

Before reopening the dam, 14 samples of Clinch River water were collected for comparison purposes, taking 2 each at miles #20 thru #14.

Handling the daily 5 gallon water samples has involved a period of development of procedure and routine, which together with evaluation studies of techniques and developmental work on self absorption has required man hours to the extent that the assay of the White Oak Valley area's mud has progressed slowly. Samples have been taken at a variety of points, but more for test and comparison than for evaluation.

Some preliminary studies have been undertaken of the extent of deadsorption possible by leaching processes applied to waterborne silt. First results, subject to modification, indicate release of less than 2% for White Oak Dam silt.

Time lag in the computations of data obtained to date in our new 5 gallon daily sampling program prevents inclusion herewith of results and their interpretation and comparison.

Special samples of water were obtained from Harriman and Oakdale representing barged water from the Tennessee and Clinch and background water from the Emory rivers.

Total beta curies from the Settling Basin are down 21% below September and 36% below the average for the year to date.

Immersion β counts of 23 daily samples of Dam and Settling Basin water indicate a reduction factor of slightly better than 10, not weighted for dilution.

[redacted]

Analyses of components present in samples of White Oak Dam and Settling Basin water were not completed this month by the Analytical Division in time for the inclusion here of their results.

T.H.J. Burnett

THJB:rr

cc: 1. R.H. Firminhac
2. K.Z. Morgan
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